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2012 GSA Annual Meeting in Charlotte

Paper No. 45-1

Presentation Time: 1:35 PM-1:50 PM

CRUSTAL RESPONSE TO LITHOSPHERE EVOLUTION: EXAMPLES FROM EURASIA

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We present a new model for the structure of the crust in an area which stretches from the North Atlantic region in the west to the Verkhoyansk Ridge in the east and encompasses Greenland, Iceland, most of Europe, West Siberian basin, and the Siberian cratons. The model is based on critically assessed results from various seismic studies, including reflection and refraction profiles and receiver function studies. The region includes a nearly continuous age record for crustal evolution over ca. 3.6-3.8 billion years. We present an analysis of the crustal structure heterogeneity in relation to geological and tectono-thermal ages of the crust, and the tectonic setting. The results indicate that the Precambrian crust is as heterogeneous as Phanerozoic, and we do not observe any evidence for thickening from the Archean to Proterozoic crust. If anything, our analysis rather suggests the opposite trend with a thicker crust in some Archean terranes than in adjacent Proterozoic blocks. However, the thickest Precambrian crust often appears to be related to ancient sutures within or at the edges of the Archean terranes. We discuss the factors that control the maximum thickness of the crust, given that 60+ km thick crustal roots are locally observed in the Baltic Shield, the Volga-Uralian subcraton, and in the Urals orogen. Some of the Precambrian crust has been affected by large-scale Phanerozoic magmatic events, such as the formation of the Dniepre-Donets rift in the East European craton, the Oslo graben in the Baltic shield, and the Viluy rift in Siberia. Despite clear similarities, there are also significant differences in the crustal structure of these rifts. Phanerozoic crust also shows strong heterogeneity and its major structural characteristics are clearly linked to lithosphere-scale modification such as lower crust/lithospheric mantle delamination in the Variscan Europe and large-scale rifting across the entire West Siberian basin. The results are summarized in a series of maps of lateral variations in crustal properties, including the depth to the basement and to the Moho, average crustal velocity, thicknesses of different crustal layers, and Pn seismic velocities.

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Charlotte Convention Center: 203B

1:30 PM-5:30 PM, Sunday, 4 November 2012

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